RUFENG LIU

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EDUCATION

Florida State University — Tallahassee, FL
Ph.D., Statistics — *expected August 2025*

Stony Brook University — Stony Brook, NY
M.S., Statistics — *December 2016*

Shandong University — Shandong, China
B.S., Mathematics — *June 2015*

RESEARCH INTERESTS

Bayesian Methodology, Nonparametric Inference, Model/Variable Selection, Spatio-temporal Statistics, Variational Inference, Statistical Computing, Bayesian Optimization, and Bayesian Machine/Deep Learning.

PUBLICATIONS

Rufeng Liu, Andrés F. Barrientos, et al. (2025). "Bayesian nonparametric modeling of mixed-type bounded data". In: *arXiv preprint arXiv:2503.09451*. (submitted to JASA).

- We propose a Bayesian nonparametric model for mixed-type bounded data, where some variables are compositional and others are interval-bounded. The model is based on a novel class of random multivariate Bernstein polynomials, which induce a Dirichlet process mixture model of products of Dirichlet and beta densities. We study the theoretical properties of the model, including its topological support and posterior consistency. This approach enables both density and conditional density estimation, accommodating response and predictor variables that take values in the simplex space and/or hypercube. We illustrate the model's behavior through analyses of simulated data and data from the 2005–2006 cycle of the U.S. National Health and Nutrition Examination Survey.

IN PROGRESS

"Independence testing between different components on the product of simplexes and the hypercube." with Andrés F. Barrientos.

- Our objective is to design a procedure to test independence among multiple compositional features and variables on bounded intervals. The procedure is capable of testing independence among subsets of the involved variables by introducing multiple binary random variables, which help control model specification. Under the null hypothesis, we assume the data-generating mechanism follows a product of mixtures of Dirichlet and beta distributions, implying independence among the variables. Under the alternative, we assume the data-generating mechanism follows a mixture of products of Dirichlet and beta distributions, indicating dependence. Implementing this approach is not straightforward, as naive MCMC methods often suffer from convergence issues. To address this, we are employing tailored pseudo-priors to enhance mixing and improve convergence.

PRESENTATIONS

Invited Talks:

- "Bayesian density estimation on the product of simplexes and the hypercube using multivariate Bernstein polynomials" Webinar by BNP-ISBA — Online — March 2024
- "Bayesian density estimation on the product of simplexes and the hypercube using multivariate Bernstein polynomials" Bayesian reading group in the Department of Statistics at FSU — Tallahassee, Florida — April 2023

Contributed Talks:

- "Bayesian density estimation on the product of simplexes and the hypercube using multivariate Bernstein polynomials" 2024 Annual Meeting of the American Statistical Association -Florida Chapter — Tallahassee, Florida — March 2024

Contributed Posters:

- "Bayesian density estimation on the product of simplexes and the hypercube using multivariate Bernstein polynomials" 2024 ICSA Applied Statistics Symposium — Nashville, Tennessee — June 2024
- "Bayesian density estimation on the product of simplexes and the hypercube using multivariate Bernstein polynomials" Theory and Foundations of Statistics in the Era of Big Data — Tallahassee, Florida — April 2024

HONORS AND AWARDS

Honorable Mention: Yongyuan and Anna Li Presentation Award May 2024
- Awarded in the department's annual research presentation competition for Ph.D. students.

Best First Year Student Award August 2020
- Departmental annual award honoring excellent performance in first-year Ph.D. coursework.

TEACHING EXPERIENCE

Florida State University Tallahassee, FL
Teaching Assistant, STA5707 - Applied Multivariate Analysis and STA5721 - High-dimensional Statistics *Fall 2024*

Florida State University Tallahassee, FL
Instructor of Record, STA1013 - Statistics Through Example *Spring 2024*

Florida State University Tallahassee, FL
Instructor of Record, STA2171 - Statistics for Biology *Fall 2022, Spring 2023*

PROFESSIONAL EXPERIENCE

GlimmAnalytics Port Jefferson, NY
Financial Analyst Intern *May 2017 - Feb 2018*
- Developed new C++ modules incorporating various indicators to reduce noise and generate market signals, facilitating the implementation of effective buy and sell strategies to mitigate trading risks. Applied the algorithms to SPY (S&P 500) and NYSE stock databases from 2016 to 2017.

PROFESSIONAL MEMBERSHIPS

- International Society for Bayesian Analysis
- International Chinese Statistical Association

REFERENCES

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